

As to the rejection claims 9 and 25 under 35 U.S.C. §112, second paragraph, such rejection is considered to be obviated by the amendment of claim 9 and the cancellation of claim 25. More particularly, claim 9 has been amended to delete the recitation of "predetermined" and to clarify features of the present invention, such that applicants submit that claim 9, as amended, should be considered to be in compliance with 35 U.S.C. §112, second paragraph.

As to the rejection of claims 1, 18 and 19 under 35 U.S.C. 102(b) as being anticipated by Aiyer et al (US 5,838,448); the rejection of claim 2 under 35 U.S.C. 103(a) as being unpatentable over Aiyer et al ('448) and further in view of Sandhu (US 5,865,666); the rejection of claim 20 under 35 U.S.C. 103(a) as being unpatentable over Aiyer et al ('448) and further in view of Birang (US 5,964,643); the rejection of claims 9, 24, 25 and 27 under 35 U.S.C. 103(a) as being unpatentable over Aiyer et al ('338) (sic) in view of Woo (WO 99/30109), Pollock (US 5,770,521) and Cadien et al (US 5,954,975); the rejection of claims 10 and 11 under 35 U.S.C. 103(a) as being unpatentable over Aiyer et al ('388) (sic) in view of Woo (WO 99/30109), Pollock ('521) and Cadien ('975) and further in view of Hiyama et al (US 5,838,447); the rejection of claim 24 under 35 U.S.C. 103(a) as being unpatentable over Aiyer et al ('388) (sic) in view of Woo (WO 99/30109), Pollock ('521) and Cadien et al ('975) and further in view of Sandhu (US 5,865,666); the rejection of claim 28 under 35 U.S.C. 103(a) as being unpatentable over Aiyer et al ('388) (sic) in view of Woo (WO 99/30109), Pollock ('521) and Cadien et al (US '975) and further in view of Birang (US 5,964,643); the rejection of claim 12 under 35 U.S.C. 103(a) as being unpatentable over Aiyer et al ('388) (sic) in view of Woo (WO 99/30109), Pollock ('521) and Cadien et al ('975); the rejection of claims 13 and 14 under 35 U.S.C. 103(a) as being unpatentable over Aiyer et al ('388) (sic) in view of Woo (WO 99/30109), Pollock ('521) and Cadien et al ('975) and further in view of Hiyama et al (5,838,447); the rejection of claim 15 under 35 U.S.C. 103(a) as being unpatentable over Aiyer et al ('388) (sic) in view of Birang ('643), Woo (WO 99/30109), Pollock

('521) and Cadien et al ('975); and the rejection of claims 16 and 17 under 35 U.S.C. 103(a) as being unpatentable over Aiyer et al ('388) (sic) in view of Birang ('643), Woo (WO 99/30109), Pollock ('521) and Cadien et al ('975) and further in view of Hiyama et al (US 5,838,447); the aforementioned rejections are traversed insofar as they are applicable to the present claims, and reconsideration and withdrawal of the rejections are respectfully requested.

At the outset, as to the requirements to support a rejection under 35 U.S.C. 102, reference is made to the decision of In re Robertson, 49 USPQ 2d 1949 (Fed. Cir. 1999), wherein the court pointed out that anticipation under 35 U.S.C. §102 requires that each and every element as set forth in the claim is found, either expressly or inherently described in a single prior art reference. As noted by the court, if the prior art reference does not expressly set forth a particular element of the claim, that reference still may anticipate if the element is "inherent" in its disclosure. To establish inherency, the extrinsic evidence "must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill." Moreover, the court pointed out that inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.

With regard to the requirements to support a rejection under 35 U.S.C. 103, reference is made to the decision of In re Fine, 5 USPQ 2d 1596 (Fed. Cir. 1988), wherein the court pointed out that the PTO has the burden under §103 to establish a prima facie case of obviousness and can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references. As noted by the court, whether a particular combination might be "obvious to try" is not a legitimate test of patentability and obviousness cannot be established by combining the teachings of the prior art to produce the claimed

invention, absent some teaching or suggestion supporting the combination. As further noted by the court, one cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention.

Furthermore, such requirements have been clarified in the recent decision of In re Lee, 61 USPQ 2d 1430 (Fed. Cir. 2002) wherein the court in reversing an obviousness rejection indicated that deficiencies of the cited references cannot be remedied with conclusions about what is "basic knowledge" or "common knowledge".

The court pointed out:

The Examiner's conclusory statements that "the demonstration mode is just a programmable feature which can be used in many different device[s] for providing automatic introduction by adding the proper programming software" and that "another motivation would be that the automatic demonstration mode is user friendly and it functions as a tutorial" do not adequately address the issue of motivation to combine. This factual question of motivation is immaterial to patentability, and could not be resolved on subjected belief and unknown authority. It is improper, in determining whether a person of ordinary skill would have been led to this combination of references, simply to "[use] that which the inventor taught against its teacher."... Thus, the Board must not only assure that the requisite findings are made, based on evidence of record, but must also explain the reasoning by which the findings are deemed to support the agency's conclusion. (emphasis added)

Turning to independent claims 1 and 9 of this application directed to the method and as illustrated in Fig. 1 of the drawings of this application, for example, and as described at pages 13 and 14 of the specification, laser light sources 9 and 10 emit laser lights L_1 and L_2 having different wavelengths which laser lights are changed into beams by the lens 11, reflected on the beam splitter 12 and then emitted on the wafer 18. Interference lights P_1 and P_2 of different wavelengths representing reflection lights of each of the laser lights L_1 and L_2 , generated by the reflection from the wafer 18 are detected by optical detectors and supplied to a film thickness evaluation unit 7 which is utilized to detect an end point of the polishing in

the manner described based upon the detected reflected lights of different wavelengths. As also described in the specification of this application in connection with Fig. 7, white light may be utilized which is changed to beams of different wavelengths or wavelength component for irradiation of the wafer and detection of the reflected lights of different wavelengths or wavelength component, and Fig. 8 illustrates the utilization of UV light operating in the same manner. Applicants note that such features have now been clarified in each of independent claims 1 and 9 and the dependent claims thereof.

Turning to claim 1, it is noted that the term "concurrently" has been changed to "simultaneously", with claim 1 reciting the features of simultaneously irradiating onto a film formed on a surface of a wafer under polishing processing lights having different wavelengths from one another, detecting reflected lights of different wavelengths from the film caused by the irradiation with the lights of the different wavelengths, and detecting the endpoint of polishing processing of the film on the basis of a relationship between intensities of the detected reflected lights of the different wavelengths. Thus, claim 1 requires the simultaneous irradiation of lights of different wavelengths onto the wafer and detection of reflected lights of different wavelengths and determination of the endpoint of polishing processing based upon a relationship between intensities of the detected reflected lights of the different wavelengths as described in connection with Figs. 4-6 of the drawings of this application, for example. Claim 9 has been amended in a similar manner and applicants submit that independent claims 1 and 9 and the dependent claims patentably distinguish over the cited art in the manner as will be discussed below.

Applicants note that Aiyer et al (US 5,838,448) has been utilized as the primary reference under 35 U.S.C. 102 and under 35 U.S.C. 103 in rejecting the claims of this application. In setting forth the rejection based upon Aiyer et al, the Examiner contends that this patent discloses "illuminating wafer 28 from its backside by an infrared source of illumination and if the wafer 28 with film 24 is alternatively

illuminating from its frontside, a different wavelength (column 3, lines 39-44), read on, concurrently irradiating a film formed on a surface of a wafer under polishing processing with light having predetermined characteristics". Applicants submit that the Examiner has mischaracterized the disclosure of Aiyer et al and Aiyer et al does not disclose as previously recited in claim 1 "concurrently irradiating...with light having two or more different wavelengths" which, by the present amendment, now recites "simultaneously irradiating...lights having different wavelengths from one another". Applicants note that Aiyer et al discloses in Fig. 1A irradiating light from the backside of the wafer which light has a specific wavelength as described in the paragraph bridging cols. 2 and 3 of this patent. Thus, light of a single wavelength is utilized for irradiation. Likewise, as an alternative embodiment, as illustrated in Fig. 1B of Aiyer et al, rather than illuminate or irradiate the wafer from its backside, in this alternative embodiment, the wafer 28 is illuminated from its frontside and light of a different wavelength than that utilized when the embodiment of Fig. 1A is utilized is provided, as described in the paragraph at col. 3, lines 39 et. seq. Thus, irrespective of the contentions by the Examiner, Aiyer et al only discloses illuminating with a light of a single wavelength and detecting reflected light of the single wavelength. Thus, col. 4, lines 35 et. seq., describes the utilization of laser source in the form of a laser diode which passes its illumination through several illuminating fibers 32a, 32b located at spaced apart locations with detection fibers detecting the reflected lights thereof. However, in this embodiment, the laser diode provides light of a particular wavelength as described in relation to Fig. 1A and therefore, applicants submit that irrespective of the position by the Examiner, Aiyer et al does not disclose in the sense of 35 U.S.C. 102 or teach in the sense of 35 U.S.C. 103 the recited features of independent claims 1 and 9 of simultaneously irradiating onto a film formed on a surface of a wafer under polishing processing lights having different wavelengths from one another. Moreover, Aiyer et al does not disclose or teach detecting reflected lights of different wavelengths from the film caused by the irradiation with

the lights of the different wavelengths nor detecting the endpoint of polishing processing of the film on the basis of a relationship between intensities of the detected reflected lights of the different wavelengths. Applicants note that claim 1 of Aiyer et al, for example, recites detecting a total intensity of the illumination reflected from the substrate and film and measuring the total reflected illumination intensity at each of a plurality of incident angles and determining an incidence angle at which the total reflected illumination intensity is at a minimum or maximum, thereby to determine the thickness or thickness change of the film. As such, it is apparent that Aiyer et al does not disclose or teach the recited features of independent claims 1 and 9 and the dependent claims of this application in the sense of 35 U.S.C. 102 or 35 U.S.C. 103, such that all claims patentably distinguish over Aiyer et al and should be considered allowable thereover.

With respect to claim 9 which has been amended in a manner indicated above and has been rejected based upon the combination of Aiyer et al, Woo, Pollock and Cadien et al, applicants submit that none of Woo, Pollock and Cadien et al disclose or teach the aforementioned recited features of claims 1 and 9, and the proposed combination represents a hindsight reconstruction attempt utilizing the principle of "obvious to try" which is not the standard of 35 U.S.C. 103. See In re Fine, supra. Accordingly, applicants submit that irrespective of the disclosures of the individual references, the combination does not provide the claimed features as recited in independent claim 9 nor independent claim 1, and all claims patentably distinguish over this proposed combination of references.

With respect to the other references cited including Birang, Sandhu and Hiyama et al, applicants submit that these patents also fail to disclose or teach the recited features of independent claims 1 and 9 which are not disclosed or taught by Aiyer et al, Woo, Pollock and Cadien et al, irrespective of the Examiner's contentions with regard thereto, and independent claims 1 and 9 patentably distinguish over this

proposed combination of references, whatever the combination may be, in the sense of 35 U.S.C. 103, such that all claims should be considered allowable thereover.

With respect to the dependent claims, applicants note that the dependent claims recite further features of the present invention and when considered in conjunction with parent claims 1 and 9 further patentably distinguish over the cited art in the sense of 35 U.S.C. 102 and 35 U.S.C. 103, and should be considered allowable thereover.

In view of the above amendments and remarks, applicants submit that all claims under consideration in this application should now be in condition for allowance, and issuance of an action of a favorable nature is courteously solicited.

To the extent necessary, applicant's petition for an extension of time under 37 CFR 1.136. Please charge any shortage in the fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 01-2135 (500.39825X00) and please credit any excess fees to such deposit account.

Respectfully submitted,



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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Please amend claims 1, 2, 9 and 10 as follows:

1. (twice amended) A method of detecting an endpoint of polishing processing, comprising the steps of:
 - ~~concurrently~~ simultaneously irradiating onto a film formed on a surface of a wafer under polishing processing ~~with light having two or more lights having different wavelengths from one another;~~
 - detecting reflected lights of different wavelengths from said film caused by the irradiation with the lights of the different wavelengths; and
 - detecting the endpoint of polishing processing of said film on the basis of a relationship between intensities of the detected reflected lights of the different wavelengths.
2. (amended) A method of detecting an endpoint of polishing processing according to claim 1, wherein said endpoint of polishing processing is detected on the basis of an intensity ratio of said detected reflected lights of different wavelengths.
9. (twice amended) A method of manufacturing a semiconductor device, comprising the steps of:
 - forming a an insulating film on a surface of a wafer;
 - attaching the wafer having the insulating film formed on its surface to a polishing processing machine;
 - starting polishing processing of the wafer attached to the polishing processing machine;

~~concurrently simultaneously~~ irradiating onto the surface of said wafer under polishing processing ~~with light having predetermined characteristics~~ lights having different wavelengths from one another;

detecting respective reflected lights of different wavelengths from the insulating film on said wafer surface generated by the irradiation with the lights of the different wavelengths;

detecting an endpoint of polishing processing on the film ~~on the basis of by~~ comparing at least an intensity of the detected reflected lights of the different wavelengths;

stopping polishing processing of said wafer on which the endpoint is detected;
detaching the wafer whose polishing processing is stopped from said polishing processing machine; and

forming a new wiring pattern on said insulating film of the wafer detached from said polishing processing machine.

10. (amended) A method of manufacturing a semiconductor device according to claim 9, wherein a polishing rate of the film is evaluated on the basis of the intensities of said detected reflected lights of the different wavelengths so as to change dressing conditions of a dresser to a pad used for polishing processing on the basis of the evaluation result.

Please cancel claims 12-17 without prejudice or disclaimer of the subject matter thereof.

Please amend claims 18-20 and 24 as follows:

18. (amended) A method of detecting an endpoint of polishing processing according to claim 1, wherein ~~said light is a white light~~ provides the lights of the different wavelengths.

19. (amended) A method of detecting an endpoint of polishing processing according to claim 1, wherein in the step of detecting the endpoint, the endpoint is detected on the basis of a spectral intensity of the detected reflected ~~light~~ lights of the different wavelengths.

20. (amended) A method of detecting an endpoint of polishing processing according to claim 1, wherein ~~said light is a UV light~~ provides the lights of the different wavelengths.

24. (amended) A method of manufacturing a semiconductor device according to claim 9, wherein the detecting an endpoint of polishing processing on the film ~~on the basis of~~ by comparing at least an intensity of the detected reflected lights of the different wavelengths includes detecting on the basis of a relationship between intensities of the detected reflected lights of the different wavelengths.

Please cancel claim 25 without prejudice or disclaimer of the subject matter thereof.

Please amend claims 26-28 as follows:

26. (amended) A method of manufacturing a semiconductor device according to claim-~~25~~ 9, wherein the detecting an endpoint of polishing processing is detected on the basis of an intensity ratio of the detected reflected lights of different wavelengths.

27. (amended) A method of manufacturing a semiconductor device according to claim-~~25~~ 9, wherein ~~the light is a white light~~ provides the lights of the different wavelengths.

28. (amended) A method of manufacturing a semiconductor device according to claim-25_9, wherein ~~the light is a UV light~~ provides the lights of the different wavelengths.